

Preface

Analgesia and Pain Management



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Guest Editor

I was honored to be asked to be the guest editor for the second analgesia edition of the *Veterinary Clinics of North America: Exotic Animal Practice*. In 2001, the first publication combined analgesia with anesthesia, both very important topics in zoological companion animal medicine at that time. Analgesia has emerged and separated from anesthesia as a critical issue in veterinary care and has unique challenges for zoological companion animal medicine and surgery. The concern for animal welfare has heightened our awareness that pain can be harmful to animals and thus the mitigation and prevention of pain are crucial. Chronic pain can adversely affect an animal's well-being, affecting the health-related quality of life. In zoological medicine the term "chronic" and "quality of life" are relative to the life span of the species, which can range from a few years to several decades. All animals, from octopi to birds, reptiles to mammals, possess the neuroanatomic and neuropharmacologic components necessary for the transduction, transmission, and perception of noxious stimuli. The issue of when does nociception become pain still plagues the evaluation of fish, amphibian, and reptile analgesia studies. The future direction of analgesia investigations must consider the comparative aspects among various species, beginning with the basic assumption that animals feel pain.

Each article in this issue examines the current metrics and research techniques applied to domestic animal pain and treatment, and which techniques can be cross-applied to investigate similar concerns in companion zoological animals.

This new edition provides the most current information on therapies and techniques to reduce pain in zoological species. In each of the reviews, the authors discuss the challenges of recognizing painful behaviors in the particular species they are writing about. Even if we as caregivers could recognize when zoological companion animals are in pain, we are further challenged by the knowledge that species variation is tremendous and the extrapolation of what limited information is available is sometimes insufficient to address the individual animal's need for pain relief.

The first article provides a primer on pharmacokinetic and pharmacodynamic approaches to understanding analgesic therapy, independent of species. Dr Butch KuKanich provides insight into the different types of research studies and clinical recommendations for analgesia therapy in zoological companion animals. His expertise in clinical pharmacology and interest in zoological medicine is presented in the first article to help understand the terminology used in other sections of the issue. Hopefully his very pragmatic approach aids the clinician when reading each of the current review articles that echo the same plea for more controlled clinical evidence based on pharmacokinetic and pharmacodynamic studies.

The order of articles is somewhat phylogenetic, starting with fish analgesia written by Dr Scott Weber. There is tremendous controversy in the fish and amphibian literature questioning if these species are even capable of feeling pain. Dr Weber takes the approach that, whether fish feel pain, are simply fear averse, or are experiencing nociception to noxious stimuli caused by a variety of factors, it is a veterinary responsibility to help ameliorate this stress or distress as would be done for other livestock, pet, laboratory animal, and wild populations. This article reviews fish neuroanatomical pathways associated with nociception and discusses what is known about behavioral observations in fish, considering the enormous species diversity of this class of animals. This review also summarizes the current analgesic use for the individual fish patient.

No one has contributed more to the amphibian analgesia literature than Dr Craig Stevens, and he was very enthusiastic about writing a review about the clinical application of the available scientific information. He is cautious about making assumptions regarding nociception versus pain and he shares his zoological perspective to help the clinician understand the issues surrounding the use of analgesics in amphibians. Dr Stevens provides the data and the tools for veterinarians to explore the amphibian pain and analgesia literature and challenges us to come to our own evidence-based conclusions.

Reptiles are another class of animals with tremendous species variability affecting neuroanatomy, physiology, and behaviors. Dr Craig Mosley has written several articles on reptile health and in this article provides an excellent review of recent investigations that have aided the veterinarian's decisions to provide analgesia for reptiles. He provides a table of information to assist in the systematic assessment of pain for reptile species. The drug dosage tables provide insightful comments to promote caution and awareness when treating reptiles with analgesics.

The avian analgesia article follows a similar format of reviewing the literature applicable to clinical treatment of avian pain. Pharmacodynamic evaluation of different analgesics in the parrot is my area of research and Dr Michelle Hawkins shares this research interest in birds as well as small mammals. We have joined together in this article to provide the reader with a perspective on current studies and what we know and don't know about interpreting avian behavior and pain relief for birds. Significant contributions have been made studying chickens, waterfowl, and pigeons, and we tried to distill and share the information as it applies to companion birds. The tables in this article are not intended to provide dosages for each of the currently available analgesic therapies, but rather to highlight published studies for the veterinarian to interpret. These research findings can be clinically applied under close observation for analgesic effectiveness in the individual bird.

Using the phylogenetic pattern, the next logical article should be on mammals but fortunately there is significantly more information on this group of zoological companion animals, and small mammals have been divided into separate articles for each of the most common companion species—rodents, rabbits, and ferrets. Dr Linda Barter has

a passion for scientific evidence and is very rigorous in her own rabbit analgesia research. Dr Barter and I share some of the same frustrations in trying to adapt analgesia methods established in humans to achieve reliable results working with small populations of rabbits or parrots that are adapted to mask painful behaviors. Dr Barter applies her knowledge of domestic animal analgesia to help interpret the current rabbit literature.

The ferret analgesia article was written by a team from the Faculty of Veterinary Medicine at Utrecht University including exotic small mammal clinician Dr Nico Schoemaker, anesthesiologist Dr Joost Uilenreef, and the first author, Dr Hugo van Oostrom, who is an intern in companion animal medicine with his PhD thesis in veterinary analgesia. Despite the ferret being a common laboratory animal species, the paucity of scientific studies on efficacy, pharmacokinetics, pharmacodynamics, and safety of analgesic drugs in the ferret is disappointing. The authors have reviewed the scientific publications as well as the clinical articles on the topic to present how to recognize painful behaviors in ferrets, what analgesic drugs are currently used, and how they can be adopted in a patient-orientated pain management plan for ferrets.

Scientific publications using rodents as models to study pain physiology and analgesia are much more numerous than for other groups of zoological companion animals, and much can be learned from the methods developed for preventing and alleviating pain in animals undergoing research studies. The rodent article is written by authors who are both contributors to advances in rodent analgesia, especially in detection and alleviation of pain and distress in laboratory rodents and the use of behavior-based pain scoring systems. This article reviews advances in pain detection techniques and makes recommendations on available analgesic agents for the treatment of pain.

Tramadol is a relatively new analgesic that is available in an inexpensive, oral form and is not a controlled drug. Tramadol received its own review article because it may be an alternative to other analgesics when treating acute or chronic pain in zoological companion animals. Additionally, tramadol pharmacokinetic and pharmacodynamic studies in zoological species are very current and provide a comparison of the same drug being used to treat various species. This should cause the reader to consider pharmacological principles addressed in the first article by Dr KuKanich. Drs Marcy Souza and Sherry Cox are at the forefront of several tramadol studies in zoological companion animals and provide a review of the drug's mechanism of action and a cross-species review of tramadol use as an analgesic.

Treating pain is not just about giving the right analgesic drug at the right dose for the species in question. The last two articles in this issue were selected to provide information about physical modalities for pain reduction. Physical medicine can be an integral part of recovery from trauma and surgery and typically has fewer adverse effects than conventional medicine. Zoological companion animals are often assumed to be less amenable to physical therapy but they are natural candidates for rehabilitation and benefit with a more rapid and complete recovery. The authors of the rehabilitation and physical medicine article work together to treat birds, reptiles, and exotic small mammals at the University of Colorado with Dr Jessica Rychel and Narda Robinson at the Center for Comparative and Integrative Pain Medicine, and Dr Matthew Johnston as faculty in the Clinical Sciences Department. There are few published studies evaluating physical medicine in these species, and only a few case reports that apply these techniques, but clinical experience adapting the same modalities effectively in domestic animals is an important step toward incorporating techniques such as massage, heat therapy, therapeutic laser, cryotherapy, and exercise.

Acupuncture is one modality of complementary and alternative veterinary medicine presented in the article by Dr Marilyn Koski. Dr Koski is an experienced zoological

medicine clinician with advanced training and experience in veterinary acupuncture, so it is a natural process for her to apply acupuncture to the bird, reptile, and small exotic mammal patients. This article is intended to be a primer to understand the principles and applications of acupuncture and is not intended to teach acupuncture techniques to the zoological companion animal veterinarian. Dr Koski provides examples of how the primary clinician can recognize patients that may benefit from acupuncture and how to work with an acupuncturist to address treatment of pain through acupuncture. Many of the zoological companion animal patients are infrequently handled and can be less amenable to calming through tactile or vocal assurance than domesticated animals; however, acupuncture can be used initially in specific calming acupoints to promote relaxation prior to the placement of the remaining needles.

My heartfelt thanks to all of the contributors that have helped to make this issue on analgesia and pain relief for zoological companion animals a very useful tool for investigators, clinicians, animal care-givers, and individuals that want to provide the best possible pain prevention and relief to animals in our care. The message is clear throughout this issue that given the diversity of zoological companion animal species, recognizing painful behaviors and evaluating analgesic efficacy is challenging, since objective measures of behavior associated with pain are difficult to define in nonverbal species, particularly less traditional animal species such as birds, small mammals, reptiles, amphibians, and fish.

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